DOE2000

Collaboratory Interoperability Framework (CIF) and Security Aspects

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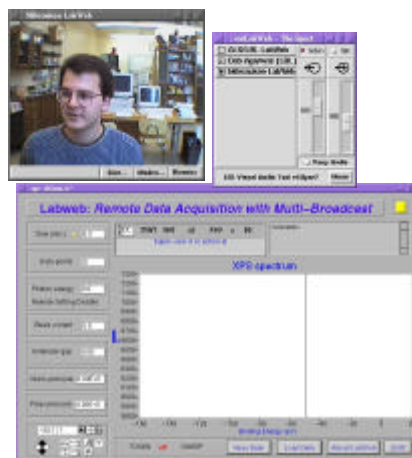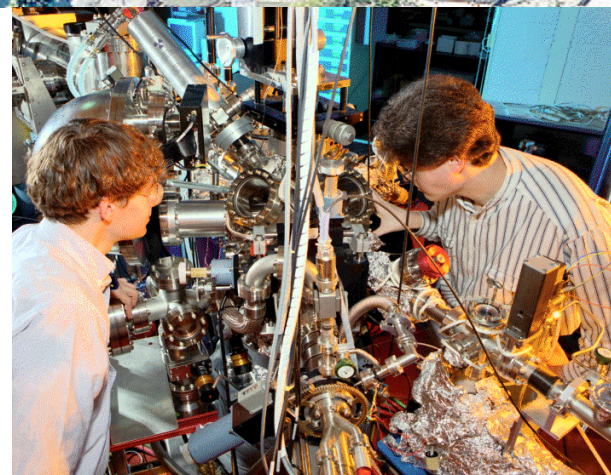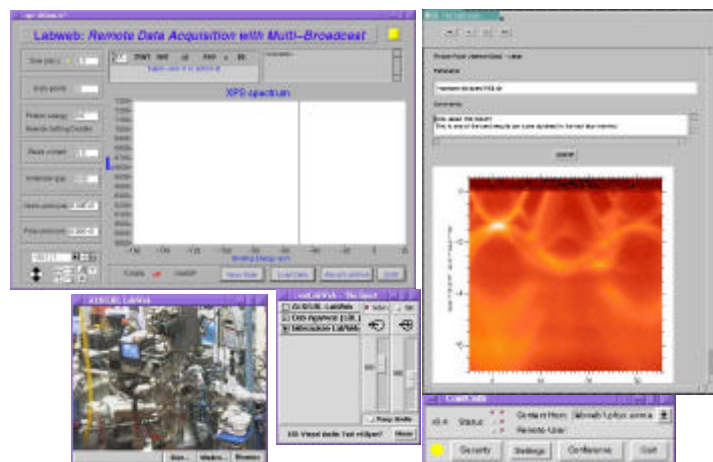Ian Foster (ANL)
Bruce Mah (SNL)
Jim Myers (PNNL)
http://www.mcs.anl.gov/cif

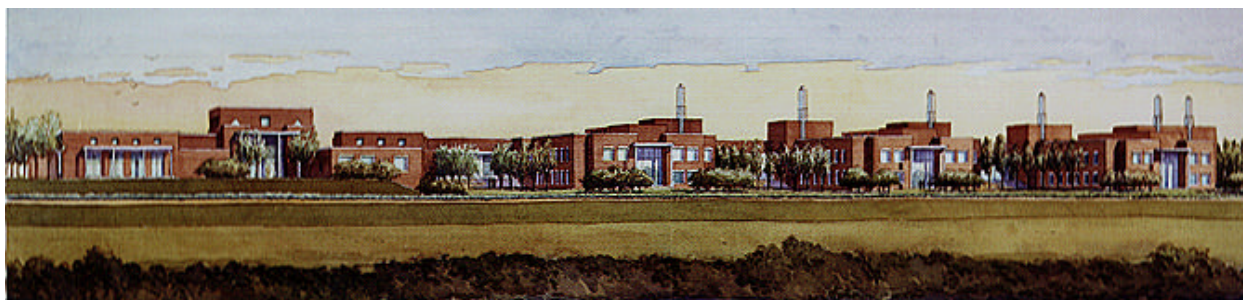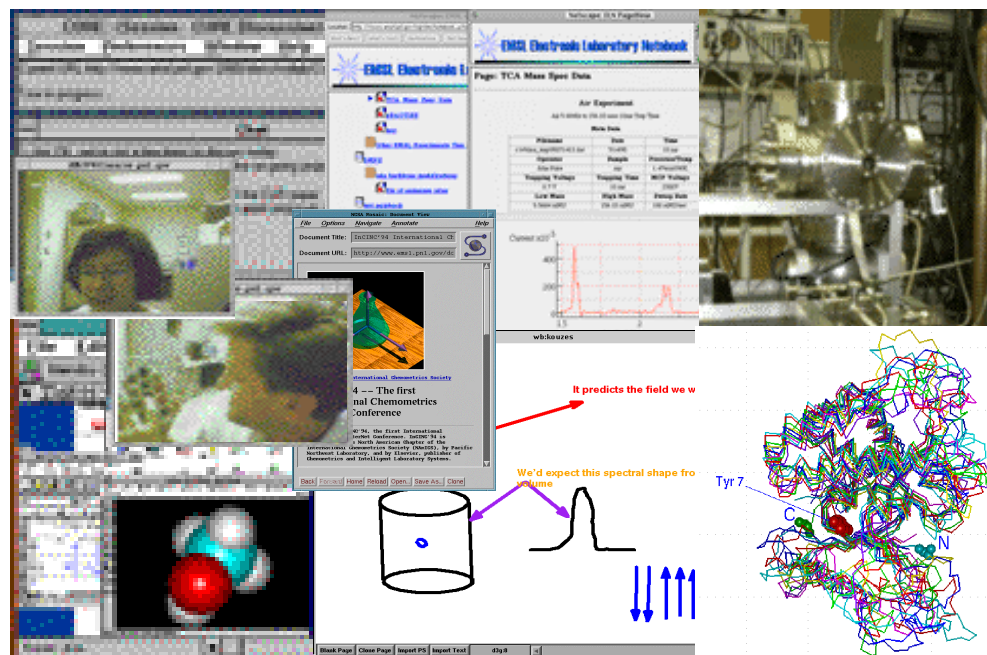# The Spectro-Microscopy Collaboratory - LBL

Network

Collaboratory Interoperability Framework

Environment Molecular Sciences Lab - PNNL

CORE 2000
User
Interface

Collaboratory Interoperability Framework

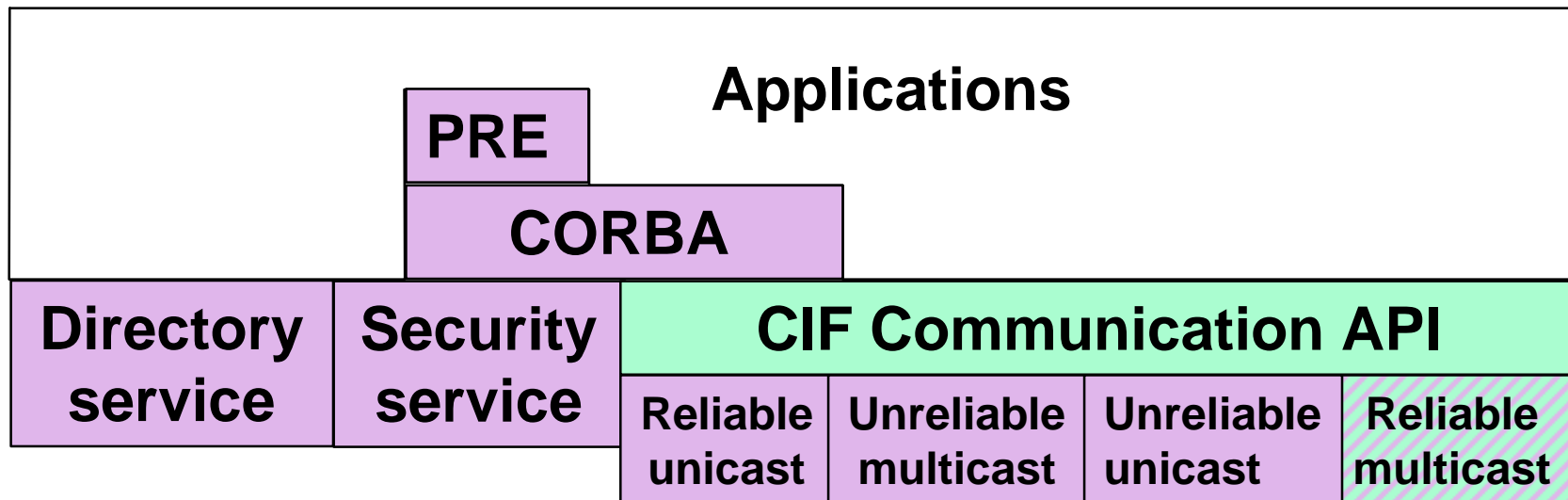# Security Issues of Collaboratories

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- **Many types of components in use**
  - commercial software
  - scientist's hand built components
  - previously developed tools
- **Multiple collaborators**
  - dynamic membership
  - receiver group not necessarily explicitly known
- **Need single login environment with shared context**
- **Heterogeneous platforms**
- **Distribution of secure software**

CIF - Objectives

- **Facilitate development and interoperability of collaboratory components by providing:**
  - —**Common communication API for unicast and multicast communication**
  - —**Reliable multicast communication**
  - —**CORBA integration**
  - —**Directory services**
  - —**Integrated security**
  - —**Access from multiple languages**
  - —**Easy to use**

CIF Structure

Applications

	PRE	
	CORBA	

Directory service	**Security service**	**CIF Communication API**			
		Reliable unicast	Unreliable multicast	Unreliable unicast	Reliable multicast

Legend

☐ development

☐ integration

Collaboratory Interoperability Framework

CIF Communication Lib

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Electronic notebooks

Shared virtual reality

Instrument control

Security Service

CIF API

Nexus communication library

Directory Service

Paradyn performance tools

MPI · TCP/IP · ShMem · UDP · Totem · · · XTP

Reliable unicast

Unreliable uni/multicast

Reliable multicast

Collaboratory Interoperability Framework
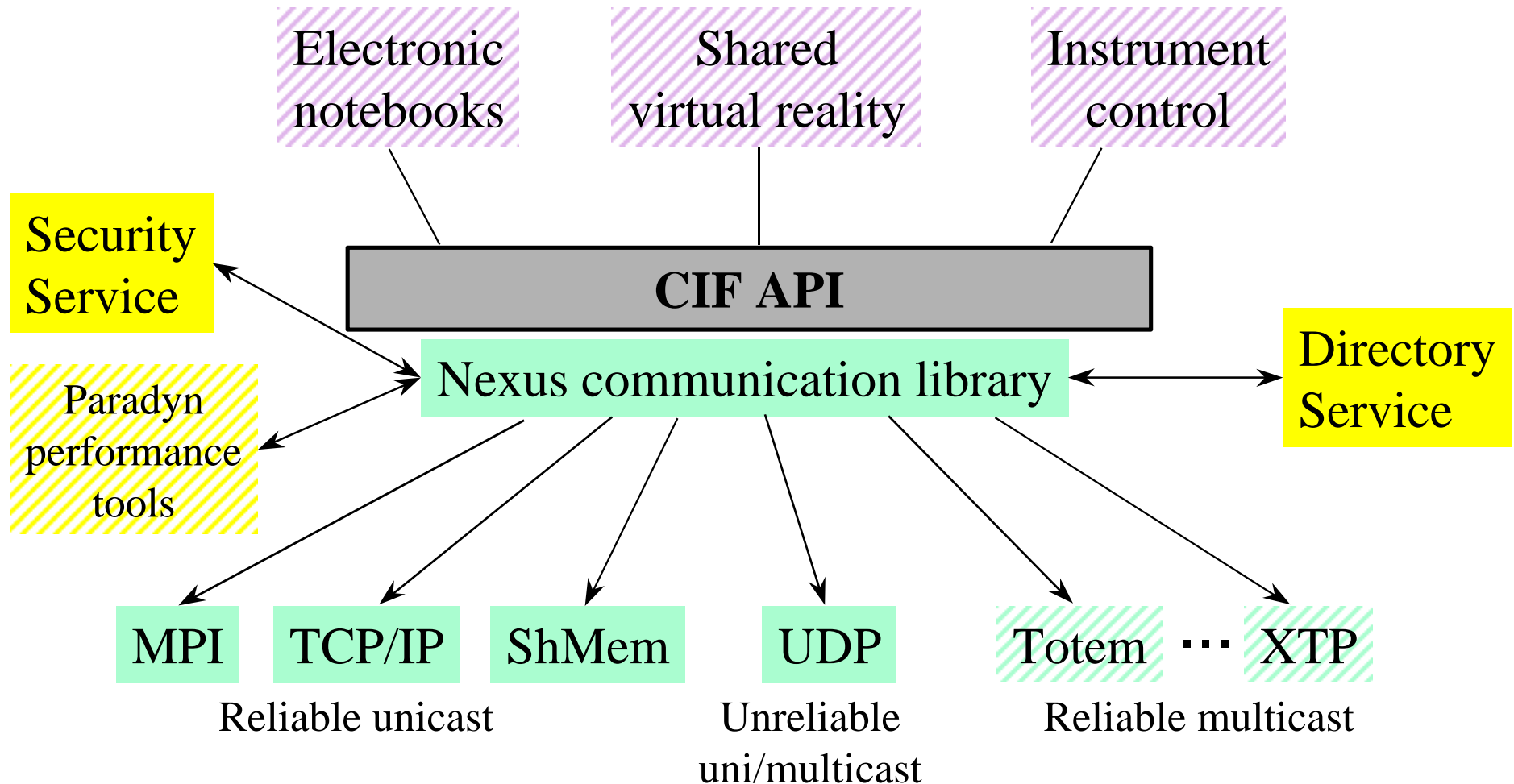
Communication Protocols

- **Unicast**
  - **unreliable unordered (UDP)**
  - **reliable source ordered (TCP)**
- **Multicast**
  - **Unreliable unordered (IP Multicast, RTP)**
  - **Unreliable source ordered (filtered IP Multicast)**
  - **Reliable source ordered (XTP)**
  - **Reliable totally ordered delivery (Totem, InterGroup)**

CIF Security Needs

- **Flexible access control specification**
  - **by user**
  - **by program or**
  - **inherited from the parent process**
- **User registration separate from individual applications**
- **Secure multicast communication**

CIF Security Plans

- **Nexus security infrastructure**
- **Integration with the Akenti mechanisms**
- **Define multicast security mechanisms**
  - **dynamic membership of the group**
  - **receiver membership not necessarily known**
  - **protocol membership mechanisms need to be aware of security restrictions**
  - **application sending the multicast not aware of the security aspects**

URL

- **Main CIF homepage**

  http://www.mcs.anl.gov/cif

- **DOE 2000 homepage**

  http://www.mcs.anl.gov/doe2000